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CURRENT LITERATURE

BOOK REVIEWS

Danish strand vegetation

WARMING¹ has published the first of a series of important monographs on the vegetation of Denmark. The aim is to treat the entire vegetation of the country from the standpoint of ecology. In view of the many years of work of the author in this field, these monographs are certain to take front rank in studies of this kind, and it is to be regretted that publication in the Danish language makes them inaccessible to many who would read them with keen interest. The first monograph deals with the strand, and the fact that more than 300 pages are devoted to the strand of a small area, and at that without including the sand-dune vegetation, gives some conception of the wealth of detail and thoroughness of treatment of the study. In WARMING'S many years of work in Denmark, the strand and dune vegetation of his country have especially attracted his interest, and the work here reviewed may be regarded as a summary of all his previous work on the strand. There is no doubt that it takes its place at once as the classic contribution on this subject. The volume is amply illustrated with many halftone reproductions from photographs and a large number of drawings, representing life-habits and structural characteristics of the strand plants.

The first chapter considers the sea-cliffs, a physiographic formation that is but slightly developed in Denmark. The granites of Bornholm are inhabited by halophytic lichens, and the Cretaceous calcareous rocks furnish a habitat for rock-boring algae. Chapters follow on the gravel and shingle shores. There are all gradations from rough stony coasts with no vegetation to older and higher gravel coasts with almost closed vegetation carpets. Between large stones there often appear the characteristic plants of salt marshes. The most widespread shore formation is the sand strand, and here successive belts of vegetation are seen, first a plantless zone, then a zone of sand algae, followed by a zone of halophytic seed-plants, mostly chenopods; last of the truly maritime formations is a zone in which various non-halophytic psammophytes mingle with the halophytes. A chapter is devoted to the vegetation of the seaweed heaps, mostly made up of ruderal chenopods. The shallow lagoons, known as "vader," are poor in plants but rich in animal life (for a fuller account of these interesting habitats, see BOT. GAZETTE 41: 78, 79. 1906); sometimes various diatoms and *Salicornia herbacea* are the only plants of such places. In similar situations, where only spring tides bring contact with salt water, are some remarkable alga societies, chiefly com-

¹ WARMING, EUG., Dansk Plantevækst. 1. Strandvegetation. 8vo. pp. vi + 325. figs. 154. Copenhagen and Christiania. 1906.

posed of *Chlamydomonas*, *Pleurococcus*, various blue-green algae, *Myxophyceae*, and diatoms. The animals of the "vader" and these algae are of enormous importance in reclaiming land from the sea. A chapter is devoted to the enalids, that is, the plants of submerged meadows, among which *Zostera*, *Ruppia*, and similar plants dominate.

An entire chapter is devoted to the ecology of *Salicornia herbacea* (another evidence of the thorough treatment of the book), which is the pioneer emergent plant of the salt marsh; its upper line is determined by the tide, since over three hours of complete emergence seems detrimental. Beyond the *Salicornia* zone are various halophytic plants, largely grasses, whose distribution varies largely with soil changes. Sand-binding grasses like *Glyceria maritima* dominate in the sandy marshes of this type. In the chapter which compares the salt marshes of the North and East seas, it is noted that the North Sea flora is much more halophytic than is that of the less salty East Sea. It is very curious, however, that some true halophytes of the East Sea region are not known from the North Sea. Reed swamps of *Phragmites*, *Scirpus*, etc., are found in brackish waters (up to 3 per cent. salt). Of much interest are the bacterial swamps in which the purple sulfur bacteria and *Beggiatoa* dominate; these occur of course where there is decaying vegetation. A chapter is devoted to the unevennesses of salt marshes (such as mounds formed by ants, moles, etc.), and their vegetation, which differs much from the ordinary flora of the marsh. The influence of artificial land reclamation is the subject of another chapter; dike-building soon results in the disappearance of salt from the marshes, and the development of the vegetation into an artificial meadow. The final chapters deal with the ecological characteristics of halophytes. Most species are hapaxanthic turf-builders. Woody plants are missing except for two half-shrubs. Succulence and leaf isolaterality are common. The flowers are largely wind-pollinated, and the seeds are scattered more by water currents than by other means. The thoroughness of this work makes us long for the other members of the series.—H. C. COWLES.

A new textbook of biology

That the teaching of biology in secondary schools has not yet reached an accepted method is evident with the appearance of each new textbook. Formerly courses in general biology were recommended, without any separation into botany and zoology. Later it became more common to offer unit courses in zoology, or botany, or physiology. During all this time, however, there have been adherents to the elementary course in general biology, and some excellent arguments for such a course have been recognized by almost every teacher.

In a recent book by HUNTER² we have another attempt to solve this problem. It is intended to present botany, zoology, and human physiology in one course to students in the first year of the high school, and has been used in the New

² HUNTER, GEORGE WILLIAM, Elements of biology. pp. 445. New York: American Book Company. 1907.